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(54) **Applicator package**

(57) An applicator package for applying active antiperspirant material having an applicator element of a density in the range of about 2 to about 4 grams/in³ having a capillary cell reservoir structure made of continuous filamentary tows having the filaments thereof oriented in a longitudinal direction, or a horizontal direction, or randomly oriented primarily in a longitudinal direction, or primarily in a horizontal direction; package is adapted to store and deliver active antiperspirant material from a liquid base e.g. alcoholic or aqueous absorbed on applicator element, the applicator element being stable with respect to the antiperspirant material e.g. made from polypropylene filaments.

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FIG.1.

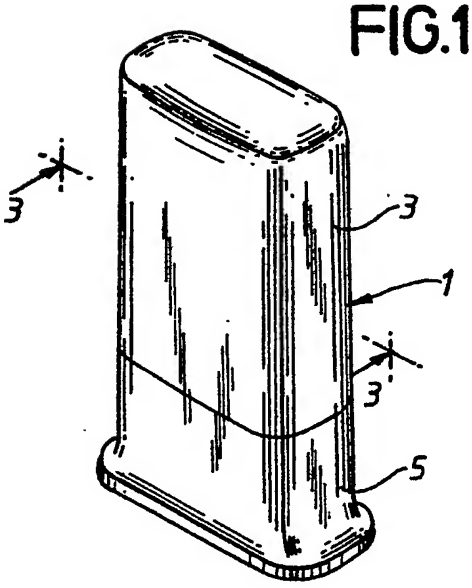
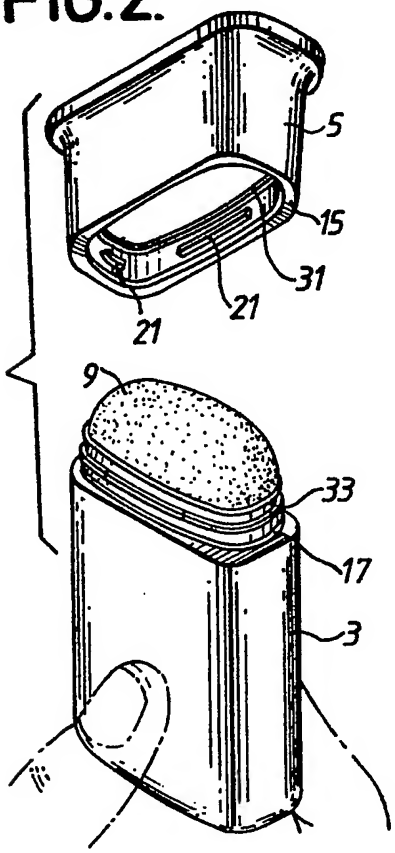


FIG.2.



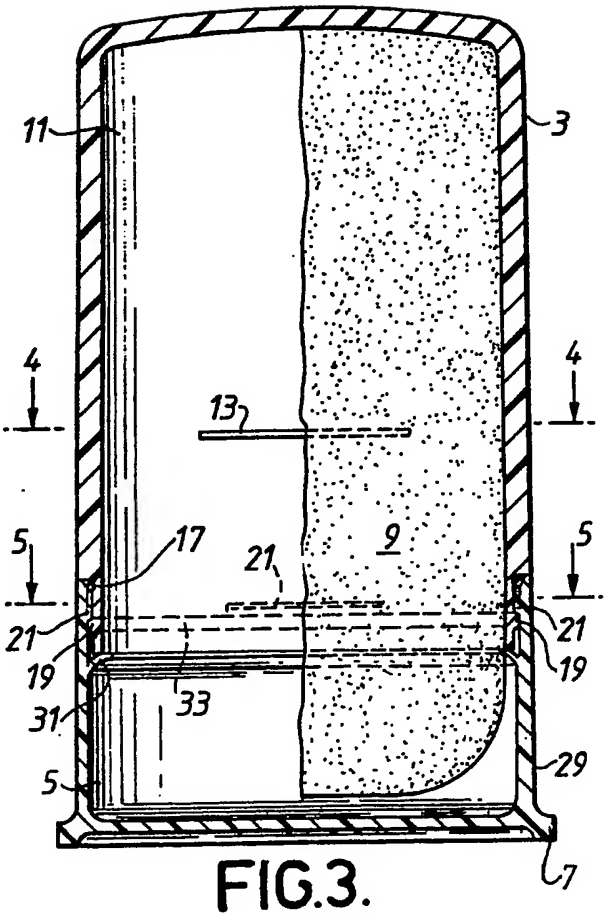


FIG.3.

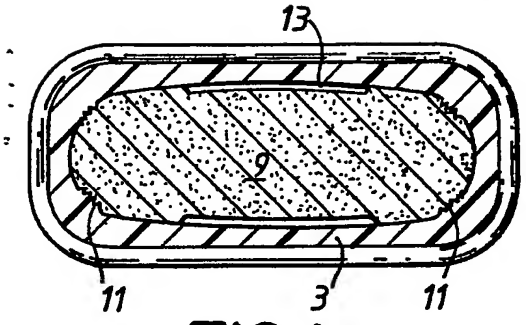


FIG.4.

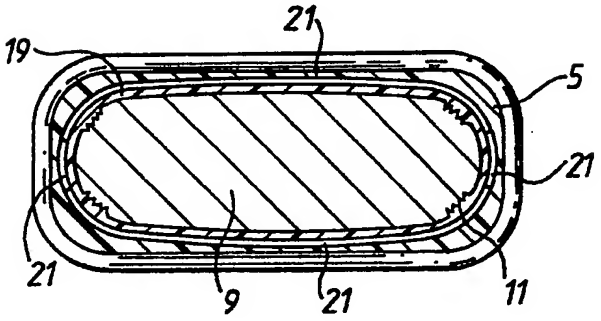


FIG.5.

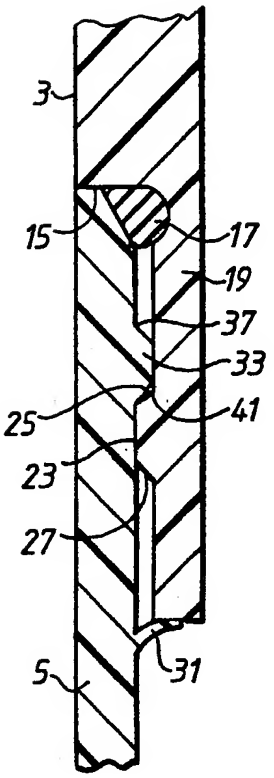


FIG.6.

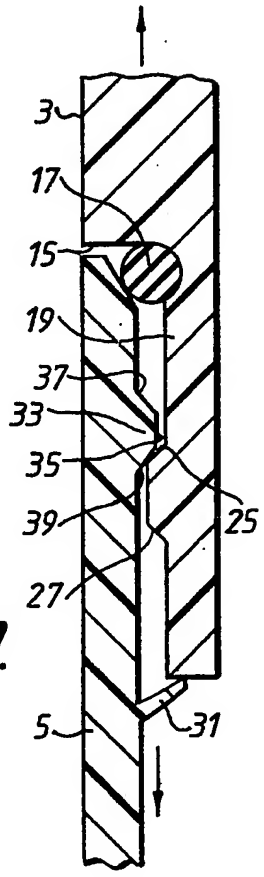


FIG.7.

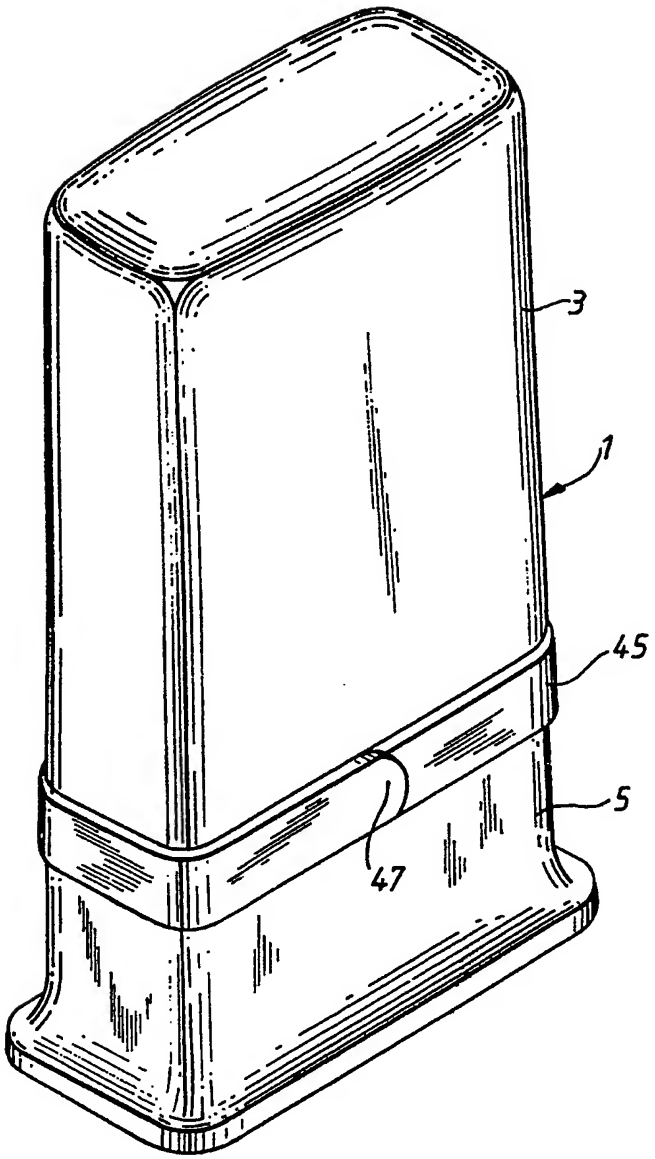


FIG.8.

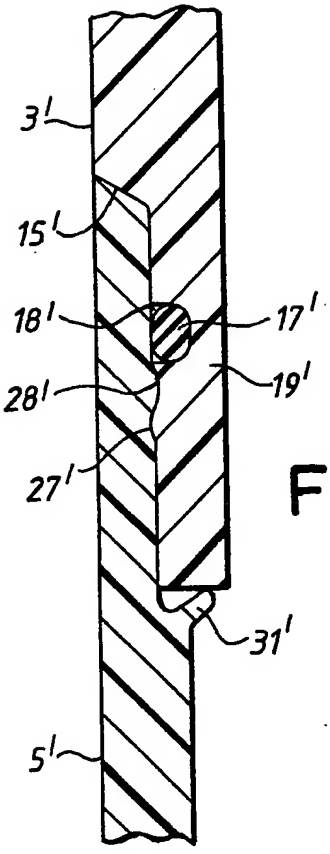


FIG.9.

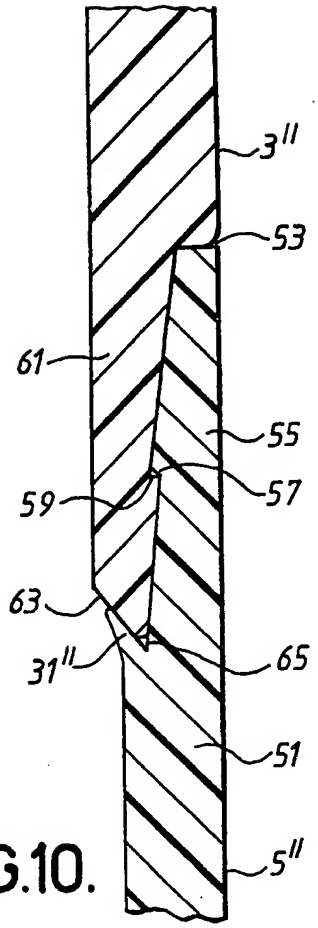


FIG.10.

SPECIFICATION

Applicator package

This invention relates to an applicator package for applying active antiperspirant material from a liquid base. More particularly, it concerns packages of this character in which the applicator element is of the capillary type.

Applicator packages for applying liquids that utilize a stationary applicator element have been known for a long time. As early as 1926, U.S. Patent 1,586,044 was granted disclosing a system of this character which employed a felt pad as an applicator element in a package designed to dispense liquid rouge. In 1955 a U.S. Patent was granted to Lepkowski (2,726,416) for a liquid applicator designed to deliver a cleaning liquid for eyeglasses which also employed a dispenser element made of "firm" or "rock hard" felt.

Applicators of the so-called "dab-o-matic" type have also been suggested for use in delivering liquid antiperspirant compositions. These employ sponge-like applicators which are unsatisfactory from several points of view. In the first place, these packages are inclined to run or flow too freely making the application of the material messy. Secondly, during use, the pores of these applicators tend to become clogged with skin debris that collects on it from underarm use. This impedes the flow of the liquid antiperspirant through the applicator. Moreover, the accumulation of skin debris in the applicator element provides an unhygenic source of material that may putrify producing unpleasant odors.

It has now been found that the above mentioned disadvantages may be avoided by employing in the above-identified applicator package an applicator element comprising a fibrous body made of continuous filamentary tows having the filaments thereof oriented in a longitudinal direction, or a horizontal direction or randomly oriented primarily in a longitudinal or horizontal direction hereinafter referred to as a "capillary applicator". Materials of this character are described in U.S. Patent 3,111,702 (See Column 1, paragraph 3). As pointed out in this patent, applicators prepared by the process described therein comprise basically a body of continuous filaments randomly oriented primarily in a longitudinal direction. The fibers of this body are bonded to adjacent fibers, and the peripheral layer of fibres is stiffened to form a peripheral shell or skin for the body. The process produces a cellular body (see Column 6, line 1) which provides an applicator which can hold liquid in its cellular structure and from which the liquid may be dispensed by applying the liquid loaded applicator to a surface with a little pressure.

To provide a capillary applicator of the above type in which the fibers are oriented in a horizontal direction or randomly oriented primarily in a horizontal direction, the bonded body of filaments having the peripheral shell or skin and prepared by the process described in U.S. Patent 3,111,702 is cut transversely and generally at about right angles to the longitudinal orientation of the fibers to form segments that have two cut surfaces and a body covered with a shell or skin. When these segments are inserted into the container, they are positioned so that the cut surfaces abut opposite sides of the vertically extending inner surface of the container. The remaining surfaces of the capillary applicator including the surface used to apply the material in the container to the subject is substantially covered with the shell or skin.

In an effort to adapt a capillary applicator of the aforementioned type to dispensing liquid antiperspirant compositions, numerous problems were encountered. It was found, for example, that when a capillary applicator made of cellulose acetate fibers was used in dispensing certain alcoholic, aqueous or aqueous-alcoholic compositions containing certain aluminum antiperspirant salts after a short period of time the capillary applicator disintegrates. It was also found that if the element was too dense, it was not possible to load the capillary applicator with sufficient antiperspirant liquid to make a practical package. Furthermore, with certain densities of the capillary applicator although it was possible to load the applicator with antiperspirant liquid it was not possible to get the liquid out of the applicator. Still, at certain densities of the applicator, the liquid antiperspirant material could not be retained within the capillary applicator and the liquid material would leak out.

Moreover, since it is necessary to deliver an effective dose of antiperspirant material with a reasonable number of strokes to the underarm area, this presented a special problem. It has been established that an effective antiperspirant dose of the antiperspirant salts is in the range of from 40 to 150 mgs. A reasonable number of underarm application strokes for delivering this dose is about 10 strokes. In addition, it is important to be able to deliver the antiperspirant material at a uniform rate. Applicators with a variety of densities were not capable of either delivering the necessary dosage of antiperspirant material with a reasonable number of strokes or delivering it at a uniform rate.

It has been found that all of the above stated problems can be avoided if the capillary applicator is made of a material that is stable with respect to the antiperspirant material present in the container and the capillary applicator has a density within the range of from 2 to 4 grams per cubic inch and preferably in the range of from 2.5 to 3 grams per cubic inch.

Leaking or running of the liquid antiperspirant product is avoided by the use of the capillary applicator elements of this invention. This is at least in part due to the fact that the liquid product is completely taken up by and held in the capillary applicator element and dispensed therefrom without the need for a liquid reservoir in the container. It is clear from this that although the element is referred to as a capillary applicator, it serves the dual function

of an antiperspirant storage element and applicator element.

At the capillary applicator densities mentioned above, i.e. 2 to 4 grams per cubic inch, and preferably, 2.5 to 3 grams per cubic inch, it is possible to deliver an effective antiperspirant dose within a reasonable number of strokes to the axilla of the subject and at a uniform rate. It is accordingly possible to deposit between about 40 mgs. to about 150 mgs. of active antiperspirant material to the underarm of subjects using up to a maximum of about 10 strokes when the applicator package of the present invention is employed. This is highly important in providing a package that will be a practical means for effectively inhibiting perspiration.

Since the active antiperspirant is applied at a uniform rate with the present applicator, the antiperspirant effect is readily duplicable. As soon as the user learns the dose that is effective for him, i.e. the number of strokes that be needs to apply for an effective amount of the antiperspirant, he can duplicate this each time he needs to employ the applicator.

As indicated above, in one aspect of the invention the capillary applicator employed is one in which the fibers are oriented in a horizontal direction or randomly oriented primarily in a horizontal direction. This has several distinct advantages. In the first place, this takes advantage of the normal shell or skin formation inherent in the manufacture of the bonded applicator units. The cut ends of the application units formed in their manufacture are inclined to be rough and would be irritating when applied to the skin. However, when the bonded segment is inserted into the container positioned so that the filaments are in a horizontal position or randomly oriented primarily in a horizontal position the natural skin or shell which is smooth as a result of the process by which it is made covers that portion of the applicator which will come in contact with the skin.

Secondly, when the capillary applicator used herein is one in which the applicator is inserted into the container so that the fibers are oriented in a longitudinal direction or randomly oriented primarily in a longitudinal direction, a cut end of the applicator is positioned to serve as the applicator surface applied to the skin. Since this was inclined to be rough, the practice is to heat fuse this surface somewhat to remove the roughness. However, when this is done, there is some sacrifice in the uniformity of flow of product from the container. Unexpectedly, when the capillary applicator is positioned in the container so that the fibers are oriented in a horizontal direction or randomly oriented primarily in a horizontal direction and the normally produced skin or shell covers the surface of the applicator that is to be applied to the skin of the subject as described above, the uniformity of flow is significantly improved.

Alcoholic or aqueous carrier systems for the active antiperspirant material are the carriers of choice. However, this gives rise to further problems. Since the alcohol in these vehicles was volatile, to prevent the loss of alcohol or water and the consequent crystallization of the active antiperspirant material, it is necessary to provide an adequate sealing means. By the same token, to take care of the situation where the vapor pressure buildup of the alcohol becomes too high, means for relieving this pressure must be provided for. To solve these problems, we provide the device described in more detail below and in the accompanying drawings, in which:

Fig. 1 is a perspective view of an applicator package embodied in the present invention shown in the closed position;

Fig. 2 is an exploded perspective view of the applicator package of Fig. 1 which has been inverted and has been opened for use;

Fig. 3 is a vertical section taken along line 3-3 of Fig. 1;

Fig. 4 is a cross section of Fig. 3 taken along line 4-4;

Fig. 5 is a cross-sectional view taken along line 5-5 of Fig. 3;

Fig. 6 is an enlarged partial vertical cross-sectional view of Fig. 1 showing the two halves of the device in closed condition;

Fig. 7 is a view similar to that shown in Fig. 6 showing the two halves of the device in separated condition; and

Fig. 8 is a view similar to that shown in Fig. 1 in which the container is provided with a sealing tape.

Fig. 9 is an enlarged partial cross-sectional view similar to that shown in Fig. 6 of another modification of this invention showing the two halves of the device in closed condition.

Fig. 10 is an enlarged partial vertical cross-sectional view of another modification of this invention; this view being similar to that shown in Fig. 6 but showing the opposite side of the device when seen in vertical cross-section.

Referring to Fig. 1, the applicator package is shown generally at 1 and comprises an upper barrel portion 3 and a lower closure portion 5. Closure portion 5 is provided with a base 7 which enables the package to stand by itself in an inverted position. Capillary applicator 9 is shown in Fig. 2 in its operating position and is held by barrel portion 3 in a manner described in more detail below. In the embodiment illustrated, this takes the form of a rectangular parallelepiped in which the angular corners are rounded off.

Barrel 3 is hollow and is provided with a plurality of vertical venting ribs 11 that extend the full length of its inner surface. As best seen in Fig. 4 in the modification illustrated, four sets of vertical ribs are provided, each of which project inwardly into the cavity of barrel 3. A pair of horizontal bar members 13 are also provided which are located about 2/3 the way down from the roof of barrel 3. These are secured to and preferably made integral with the internal surface of barrel 3, and project into the cavity of barrel 3.

Horizontal bar members 13 serve as locking means to maintain capillary applicator 9 within barrel 3. After the liquid is introduced into barrel 3 and capillary applicator 9 is inserted into it, the applicator takes up essentially all the liquid and swells. As a consequence, horizontal bars 13 become locked into the body of applicator securing it into position.

Ribs 11 serve a number of functions. Their prime

function is as a venting means. This may come into play during the use of the applicator. As the antiperspirant material is applied, voids are left in the applicator which must be filled with air if the applicator is to continue to deliver liquid. Part of this is supplied through the pores of the applicator element which is designed with this in mind. However, a significant amount of air also enters the inside of barrel 3 through venting ribs 11.

In a somewhat analogous fashion, venting ribs 11 serve as escape channels for excess pressure that may build up inside barrel 3 due to the vaporization of some of the low boiling materials present in the composition. This will serve to direct the pressure to the pressure relief system described in more detail below.

Still a further function of venting ribs 11 is seen in the filling operation. In the filling, also described in more detail below, the liquid antiperspirant composition is first placed in barrel 3 and then capillary applicator 9 is inserted into barrel 3. In this instance, venting ribs serve as a conduit for excess antiperspirant liquid that is displaced from barrel 3 when capillary applicator element 9 is inserted.

Another function for venting ribs 11 has to do with the fabrication of barrel 3. For the purpose of convenient application, it is desired that the internal configuration of barrel 3 be oval to accommodate an oval shaped capillary applicator element 9, but at the same time, the outer configuration of barrel 3 is to be rectangular in cross section. This is made possible by venting ribs 11 which reduces the bulk of material at the inside corners of barrel 3.

Near its lower outer margin a step 15 is cut into the outer surface of barrel 3. This step extends around the circumference of barrel 3 and provides a seat for O-ring 17. These are best seen in the detailed drawing of Fig. 5. O-ring 17 is generally circular in cross section in its uncompressed condition. When it is compressed by closure 5 as described in more detail below, this is deformed and serves to seal the interior of the container from the atmosphere.

O-ring 17 may be made of any of a variety of compressible materials. It has been found, however, that the best results are obtained with O-ring fabricated from Buna-N rubber.

About 1/2 way down vertical leg 19 of step 15 there is provided a discontinuous bead element 21. In the embodiment shown, bead 21 is divided into four sections; two sections being disposed on the sides of barrel 3 and one section each located on the front and back surfaces of vertical leg 19 of barrel 3. Bead 21 is formed so as to have a vertical surface 23, an upper angular surface 25 inclined upwardly and inwardly, and a lower angular surface 27 inclined downwardly and inwardly. Bead 21 is designed with two functions in mind. The first function is to engage a corresponding bead on the closure 5 when the latter is snapped into position and thereby serving as a locking mechanism. The second function is to provide a venting mechanism which will be described in more detail below.

Closure 5 is provided with an upwardly extending skirt 29. Projecting inwardly of this skirt is a flexible mechanical seal 31 which engages the lower margin of barrel 3 when the parts are assembled. A discontinuous bead 33 similar to discontinuous bead 21 of barrel 3 is provided in skirt 29. This has a vertical surface 35, an upper angular surface 37 inclined downwardly and inwardly and a lower angular surface 39 inclined upwardly and inwardly. In the case of bead 33, however, this is directed inwardly toward the center of the cavity of closure 5.

In use, a quantity of a liquid antiperspirant composition described in more detail below is charged into barrel 3. Capillary applicator 9 is then inserted into barrel 3 and allowed to absorb all of the liquid. Closure 5 is then applied to barrel 3 until the lower margin of barrel 3 engages mechanical seal 31 of the closure member 5. In this position, bead 21 of barrel 3 has been snapped over bead 33 of the closure 5 and the upper margin of closure 5 engages and compresses O-ring 17. At the same time, mechanical seal element 31 is engaged by the lower margin of leg 19 and bent downwardly (compare position of element 31 in Figs. 7 and 6) to form an auxiliary mechanical seal. The applicator package is now sealed from the atmosphere. The relationship of the internal parts in this condition of the package is best seen in Fig. 6.

If an undue amount of pressure begins to build up within the package, the upward movement of barrel 3 commences. A small clearance 41 is provided between surface 25 of bead 21 and surface 39 of bead 33 to permit the movement of these parts with respect to each other. As pressure builds up in the container, surface 25 rides upwardly on the inclined surface 39 which results in a spreading of the upper margin of closure 5 resulting in a reduction of the compression on O-ring 17. This serves to release the seal and permits the venting of the vapors. The relationship of the parts in the venting position is best shown in Fig. 7.

When the pressure within the container is released, barrel 3 automatically slides downwardly on surface 39 until the upper margin of skirt 29 of closure 5 engages and compresses O-ring 17 to reseal the container. In this condition, it again assumes the sealed position shown in Fig. 6. The automatic return of barrel 3 from the position shown in Fig. 7 to the position shown in Fig. 6 after venting the pressure within the container is assured by several features of the present construction. In the first place, closure 5 is made of a plastic that has resilient and elastomeric properties. In the venting position shown in Fig. 7, skirt 29 of closure 5 is flexed outwardly. Because of its resiliency in this condition, skirt 29 is under a tension that is biased inwardly. When the internal pressure of the container is released, this force tends to force barrel 3 to ride downwardly on slope 39 of bead 33.

Another feature of construction that assures the automatic return of barrel 3 from its position in Fig. 7 to its position in Fig. 6 on the release of the pressure in the container is the difference in the angular inclination of surface 25 of bead 21 and surface 39 of bead 33. The difference is such that when barrel 3 moves upwardly in response to internal pressure in the container, bead 21 enters into an interference engagement with bead 33. The difference in the

angular inclination between surface 25 and surface 39 may vary somewhat. A very suitable difference is about 15°. In the modification shown in the drawings, the angle that surface 25 makes with the horizontal is about 30°; whereas, the angle that surface 39 makes with the horizontal is 45°.

Fig. 8 shows a modification of this invention that employs a sealing tape 45. This is applied to cover the joint formed when barrel 3 and closure 5 are assembled. This is preferably provided with a starter tab 47 which may be grabbed to remove the sealing tape 45 when the package is about to be used. Sealing tape 45 will generally be made of a moisture barrier pressure sensitive tape. One such tape is a polyester tape marketed under the trade name MYLAR.

Fig. 9 is an alternative construction embodied in the present invention in which vertical leg 19' of barrel element 3' is provided with a circumferential groove 18' in which compressible O-ring 17' is disposed. The outer surface of O-ring 17' extends outwardly from the outer surface of vertical leg 19' so that it can form a circumferential interference seal with the inner surface of closure portion 5' near the upper end of the latter. The interference sealing takes place even before closure portion 5' and barrel portion 3' are mechanically locked in the snap-lock position. This has the advantage in that a seal is formed even if the consumer does not return the closure to the full locked position.

This modification of the invention also provides for venting of the container when an undue vapor pressure develops in it. If an alcohol pressure should develop in the container, this would cause the closure member 5' to expand outwardly away from O-ring 17'. This will permit the vapors to bypass the compressible O-ring 17'. When the pressure inside the container is equalized with the atmospheric pressure, the elastomeric properties of closure 5' will return it to its normal position.

In this modification, closure member 5' is constructed so that the cross-section thickness of its wall at its upper portion is smaller than that of its lower portion. In addition, flexible mechanical seal 31' is constructed so it tapers upwardly and inwardly from its origin in closure 5' to its free margin. The angle that mechanical seal 31' makes with the vertical may vary somewhat. In a typical example, this will be about 60°.

In still a further modification of this alternative the lower lip of barrel 3' may be formed so that it forms an acute angle with the vertical and thus nestles in the angle formed by seal 31' and the vertical. The angular dimension of these elements may also vary somewhat. However, again in a typical case the angular margin of the lower lip of barrel 3' will make an angle of about 45° with respect to the vertical; whereas, the angle formed between seal 31' and the vertical will be about 30°.

The modification of this invention illustrated in Fig. 9 is also formed so that the upper lip of closure 5' is formed as a bevel 15'. This provides several advantages. Thus, the visual gap between the closure and barrel when the parts are assembled is reduced. Moreover, this assists the consumer in assembling the closure and barrel, and reduces the danger of any sharp edges of plastic. In addition, this also assists in getting a better seal engagement.

The snap-lock arrangement in the modification shown in Fig. 9 is a little different from that shown in the other modifications illustrated. In this instance, a rounded outwardly extending bead 27' is provided on the outer wall of leg 19' which engages a similarly rounded bead 28' that extends inwardly of the inner surface of the wall of closure 5'.

Fig. 10 illustrates another embodiment of this invention which dispenses with the need of an O-ring like ring 17 shown in Fig. 6. As in the other modifications illustrated, this modification comprises a closure portion 5" and a barrel portion 3". Flexible mechanical seal 31" is also provided which in structure and function are similar to flexible mechanical seal 31 or 31'.

To provide a seal in this modification of the invention the wall 51 of closure portion 5" is tapered upwardly and outwardly toward its free margin 53 to form a tapered section 55. A step is cut in the lower portion of tapered section 55 to form an undercut 57 which will engage a mating undercut 59 in barrel 3" described in more detail below to form a lock that holds the closure portion 5" and barrel portion 3" together when these parts are assembled.

Wall 61 of barrel portion 3" is tapered downwardly and inwardly toward its free margin 63. The latter takes the form of a bevel which permits it to slide down into the space 65 which is lateral to flexible seal member 31". A step is cut in the upper portion of tapered wall 61 to provide an undercut 59 which as indicated above forms a lock with undercut 57.

To form a seal to the atmosphere, the barrel 3" and the closure 5" are made of different materials, usually plastic materials that have different degrees of flexibility. In a preferred embodiment of this invention, barrel 3" is made of rigid polypropylene, whereas closure 5" is made of flexible polyethylene (high density).

Barrel 3" and closure 5" are dimensioned so that when they are assembled and pushed home as illustrated in Fig. 10, tapered wall 55 is flexed outward. Because this material is flexible, it is under a tension which is biased inwardly. This forms a seal between the tapered surface of walls 55 and 61.

This modification of the invention also permits the venting of the container to the atmosphere when the vapor pressure inside it gets too high. In this instance, a small upward movement of the barrel 3" in response to the increase in internal pressure will break the seal between the tapered surfaces of walls 55 and 61 causing the container to vent to the atmosphere.

In some instances, the exposed surface of applicator 9 as seen, for example, in Fig. 2 may be too rough when applied to the axilla of the subject. If this is the case, this can be remedied by applying heat to the surface of the applicator as, for example, by using a hot platen. This will form a smooth skin on the surface of the applicator which may serve to reduce any discomfort which may be caused by the applicator surface.

Still another feature of the present invention is the

fact that, during storage in the upright positions that these packages will be subject to in the home, barrel 3 containing the capillary applicator 9 loaded with the liquid antiperspirant composition will be in an inverted position i.e. the capillary applicator 9 will be facing downwardly. In this way, the liquid contained in the applicator gravitates toward the business end of the applicator. In this fashion, the applicator is ready for use immediately to deliver the effective antiperspirant dose. However, the antiperspirant liquid is prevented from leaking out of the applicator by the capillary forces that the applicator exerts on the liquid. Thus, the gravitational forces are balanced against the capillary forces. When the loaded applicator is applied to the underarm with a certain amount of pressure, the liquid is deposited on the skin from the relatively superficial areas of the applicator. The liquid so removed from the applicator is replaced by liquid contained in the more interior portions of the applicator.

The filamentary material that is used in fabricating the applicator elements employed in the present invention can vary somewhat. By way of example, nylon mono-filaments, cellulose acetate, polypropylene, etc. may be employed. However, the material of choice is polypropylene since it offers several advantages. This is inert to almost all of the active antiperspirant materials. Moreover, the rate of delivery seems most uniform with a polypropylene applicator, and delivering the requisite dose of active antiperspirant material with a reasonable number of strokes seems most readily accomplished when the applicator is fabricated from polypropylene filamentary material using the process described in U.S. Patent 3,111,702 mentioned above.

In formulating the antiperspirant composition of this invention, a variety of active antiperspirant materials may be employed. By way of example, mention may be made of aluminum chlorhydroxide and aluminum hydroxybromide, aluminum chloride as well as the aluminum/zirconium/glycine antiperspirant complexes disclosed in Patent No. 3,792,068 issued February 12, 1974 to Luedders et al.

The preferred aluminum compound for preparation of the Luedders et al complex is aluminum chlorhydroxide of the formula $Al_2(OH)_5Cl2H_2O$. The preferred zirconium compound for preparation of the Luedders et al complex is zirconyl hydroxychloride having the formula $ZrO(OH)Cl3H_2O$. The preferred amino acid for preparing the Luedders et al complex is glycine of the formula $CH_2(NH_2)COOH$. Salts of such amino acids can also be employed in such antiperspirant complexes.

Other suitable activities for use in the present invention comprise mixtures of aluminum chloride with other aluminum salts less acidic than aluminum chloride e.g. aluminum hydroxychloride (or aluminum chlorhydroxide). These are described in Canadian Patent 958,338 issued November 26, 1974. However, the antiperspirant of choice is aluminum sesquichlorohydrate.

The quantity of active antiperspirant material that will be used will vary somewhat. For the most part, this will constitute between about 10 % to about 40 % by weight based on the total weight of the fluid composition employed in preparing the applicator package.

A large component of the fluid vehicle that will be employed in the preferred antiperspirant compositions that are employed in the present invention will be ethyl alcohol. The quantity utilized, however, will depend on the other components of the composition and particularly the amount of water that may be contained in it. Usually, this will constitute between about 40 % to about 90 % by weight based on the total weight of the antiperspirant composition with the preferred range being between about 50 % to about 65 % by weight.

Water may also be used in significant amounts as part of the fluid vehicle employed. When it is employed, it will comprise between about 5 % to about 80 % by weight of the total antiperspirant composition. In a preferred aspect of this invention, the water will be present in the range of from about 40 % to about 70 % by weight.

In addition to the above components, the antiperspirant composition used herein may also contain ingredients that are conventionally employed in alcohol or aqueous antiperspirant compositions. These include neutralizing agents (e.g. glycine), volatile or non-volatile emollients (e.g. cyclomethicone, isopropyl myristate), surfactants (e.g. polyoxyethylene 2-isostearate [Aerosurf 66-E-2]), perfume, coloring matter, preservatives, etc.

The following Examples are given to further illustrate the present invention. It is understood, however, that the invention is not limited thereto.

An aqueous-alcoholic antiperspirant composition having the following formula was prepared:

EXAMPLE 1

Antiperspirant Composition

Aluminum sesquichlorohydrate	30%
Alcohol	53.29%
H_2O	8%
Glycine	0.5%
Isopropyl myristate	3.00%
Cyclomethicone F-222	1.5%
Polyoxyethylene 2-Isostearate Ether (Aerosurf 66-E-2)	3%
Perfume	0.30%
Color QS	100%

Using the procedure of Example 1 of U.S. Patent 3,095,343 and employing nylon mono-filament material, the applicator element described above was prepared having the following dimensions: thickness .898 in.; width 1.696 in.; height 2.622 in.; weight 18.10 grams. About 47.8 grams of the antiperspirant composition described above was introduced into the body of the container described above, after which the applicator element was inserted. Because of the capillary action of the applicator element, essentially all of the solution introduced into the body of the container was taken up in the interstices of the applicator element.

EXAMPLE 2

The procedure and container as described in Example 1 is employed excepting that in place of the applicator element described in that Example, a polypropylene applicator element having a density of 2.88 gm/in^3 is employed.

EXAMPLE 3

The procedure and container of Example 1 is employed excepting that the applicator is made of polypropylene that has a density of 2.66 gm/in³ and the composition in the container is as follows:

	% *by Wt.*
Aluminum chloride 50% solution	30.00
Magnesium hydroxide	3.75
Glycine	0.50
Aluminum zirconium trichlorohydrate (AZ-4)*	10.00
Water, deionized	49.40
Perfume	0.50
PPG-5 Ceteth 20	5.00
FD&C Blue #1 (0.1 Aq. sol.)	0.25
D&C Yellow #10 (1.0 Aq. sol.)	0.60

Appearance – clear solution
Color – light green
pH 3.32 ± 0.3

* $Al_4ZrO(OH)_{11}Cl_3$

EXAMPLE 4

The procedure and container as described in Example 1 is employed excepting that in place of the applicator element described therein a polypropylene applicator element is employed having a density of 2.88 gm/in³ and the composition in the container is as follows:

	% *by Wt.*
Colloidal Magnesium Aluminum Silicate, HV	0.500
Water, deionized	46.720
Glyceryl monostearate, non-self emulsifying	3.760
N(Lauroyl colamino formyl-methyl) pyridinium chloride	0.160
Lauric acid, 95%	0.080
Polyoxyethylene (23) lauryl ether	2.500
Polyoxyethylene (4) lauryl ether	1.000
Aluminum chlorhydroxide, 50%	44.00
Color FD&C Red #4 (0.1% aq. sol.)	0.575
Color FD&C Yellow #5 (0.1% aq. sol.)	0.385
Perfume	0.320
	100.000

Appearance – smooth, opaque lotion
Color – pale, peach pink
pH 3.65-4.30
Viscosity – 24 hrs. (#2 spindle @ 20 rpm 15 seconds) 100-1000 cps
Density at 25°C 1.10-1.14 grams cc.

EXAMPLE 5

The procedure, container and composition described in Example 4 are employed excepting that in place of the applicator element described therein, a polypropylene applicator element having a density of 2.66 gm/in³ is used.

Barrel 3 and closure 5 may be fabricated in any of a variety of materials. However, polypropylene plastic resin has been found to be particularly suitable for molding these elements.

Although the invention has been described with reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from the scope of this invention.

CLAIMS

1. An applicator package for applying a liquid antiperspirant product comprising a container and an applicator element, said applicator element being stable with respect to said liquid antiperspirant product and having a capillary cell reservoir structure made of continuous filamentary tows having the filaments thereof oriented in a longitudinal direction, or a horizontal direction, or randomly oriented primarily in a longitudinal or primarily in a horizontal direction; said applicator containing in its capillary cell reservoir a liquid carrier containing an effective amount of an active antiperspirant material; said container having essentially no free liquid that is not held in said applicator element; said applicator element having a density in the range of from about 2 to about 4 grams/in³.

2. An applicator package for applying a liquid antiperspirant product comprising a container and a capillary applicator element supported by said container, said applicator element being stable with respect to said liquid antiperspirant product and having a capillary cell reservoir structure made of continuous filamentary tows having filaments oriented in a longitudinal direction, or a horizontal direction, or randomly oriented primarily in a longitudinal or primarily in a horizontal direction, fibers of said applicator element being bonded to adjacent fibers to form said cellular structure and the peripheral layer or layers of fibers being stiffened to form a peripheral shell or skin for said applicator element, said applicator element having a density in the range of from 2 to 4 grams/in³, and containing in its capillary cell reservoir a liquid carrier containing an effective concentration of active antiperspirant material, said container having essentially no free liquid that is not contained in said applicator element.

3. An applicator package according to Claim 2 in which said applicator element has a density in the range of from about 2.5 to about 3 grams/in³.

4. An applicator package according to Claim 2 or 3 in which the applicator element is made of filaments of polypropylene.

5. An applicator package according to Claim 4 wherein said applicator element has a density in the range of from about 2.5 to about 3 grams/in³.

6. An applicator package according to any preceding Claim in which said liquid carrier is an alcoholic or an aqueous vehicle.

7. An applicator package according to any preceding Claim in which said active antiperspirant material is an aluminum salt or an aluminum complex.

8. An applicator package according to any pre-

ceding Claim in which said active antiperspirant material is aluminum sesquichlorohydrate.

9. An applicator package according to Claim 1, 2, 3, 4, 5, 6, 7 or 8 in which the active antiperspirant material is present in said liquid carrier at a concentration of from about 10% to about 40% by weight based on the total weight of the liquid composition employed in preparing the applicator package.

10. An applicator package for applying active antiperspirant material in liquid form comprising a container and an applicator element, said container having a body portion and a closure portion, means for forming a primary seal between said body portion and closure portion when said body portion and closure portion are assembled together; said package being ventable when the pressure therein reaches a certain predetermined level; said applicator element having a capillary cell reservoir structure made of continuous filamentary tows having the filaments thereof oriented in a longitudinal direction, or a horizontal direction, or randomly oriented primarily in a longitudinal or primarily in a horizontal direction; said applicator element containing in its capillary cell reservoir an alcoholic or aqueous vehicle containing an effective amount of an active antiperspirant material; said container having essentially no free liquid that is not held by said applicator element.

11. An applicator package according to Claim 10 in which said sealing means is a flexible O-ring that is interposed between said body portion and closure portion of said applicator package.

12. An applicator package according to Claim 11 including an auxiliary mechanical sealing means, said mechanical sealing means being disposed below said flexible O-ring sealing means in the assembled package.

13. An applicator package according to Claim 10, 11 or 12 in which one of said closure portion or body portion is made of a relatively rigid material and the other is made of a relatively flexible material whereby when said closure portion and body portion are assembled together said element made of the relatively flexible material is put under a tension which is biased toward said other element thereby forming said primary seal between said elements.

14. An applicator package according to Claim 13 in which said closure portion is made of relatively flexible material and said body portion is made of relatively rigid material.

15. An applicator package according to Claim 14 including an auxiliary mechanical sealing means disposed below said primary seal.

16. An applicator package according to any of Claims 10 to 15 in which said container comprises a body portion and a closure portion, said body portion containing said applicator element, said closure portion being provided with a base which enables the package to stand by itself on said base when said body portion is inverted and inserted into said base, said package being essentially non-self-supporting when the package is stood on the body portion end.

17. An applicator package according to any of Claims 10 to 16 in which said container comprises a body portion and a closure portion, said body portion being provided with walls whose outside configuration in cross section is essentially rectangular and whose inside configuration in cross section is essentially elliptical, the inside surface of said body portion being provided with longitudinally extending ribs in the area adjacent each corner of the said outer rectangularly shaped walls whereby the bulk of material forming the wall inwardly of said corners is reduced.

18. An applicator package for applying a liquid antiperspirant product comprising a container and a capillary applicator element supported by said container, said applicator element being stable with respect to said liquid antiperspirant product and having a capillary cell reservoir structure made of continuous filamentary tows hoving filaments oriented in a horizontal direction or randomly oriented primarily in a horizontal direction, fibers of said applicator element being bonded to adjacent fibers to form said cellular structure and peripheral layer or layers of fibers being stiffened to form a peripheral shell or skin for said applicator element, said applicator element being positioned in said container so that a free margin of said applicator that is to serve as the surface which is to be applied to a subject is covered with said shell or skin, said applicator element having a density in the range of from 2 to 4 grams/in^3, and containing in its capillary cell reservoir a liquid carrier containing an effective concentration of active antiperspirant material, said container having essentially no free liquid that is not contained in said applicator element.

19. An applicator package according to Claim 18 wherein said capillary applicator is made of polypropylene.

20. A method for delivering an effective dose of an antiperspirant material which comprises applying to the underarm of a subject active antiperspirant material from an applicator package defined in Claim 1, 2, 3, 4, 5, 6, 7, 8, 18 or 19 employing no more than up to about 10 strokes to apply said effective dose.

21. A method for delivering an effective dose of an antiperspirant material which comprises applying to the underam of a subject active antiperspirant material from an applicator package defined in Claim 1, 2, 3, 4, 5, 6, 7, 8, 18 or 19 employing no more than up to about 10 strokes to apply said effective dose; the active antiperspirant material being present in said liquid carrier at a concentration of from about 10% to about 40% by weight based on the total weight of the liquid composition employed in preparing the applicator package.

22. An applicator package according to claim 1, 2, 10 or 18, substantially as described with reference to any Figure or Figures of the accompanying drawings.

23. An applicator package according to claim 1, 2, 10 or 18, substantially as described in any of the foregoing Examples.

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